

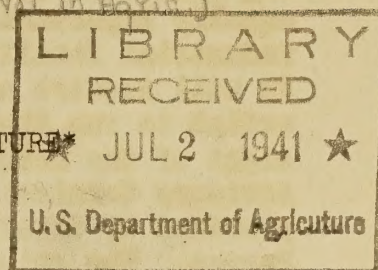
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NUTRITION IN THE UNITED STATES:
A PROGRAM FOR THE PRESENT EMERGENCY AND THE FUTURE*

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That the present emergency calls for a great increase in the size of our Army and Navy with provision of all that is necessary to make these armed forces into a superlative instrument of war, scarcely anyone denies. That it calls for rapid acceleration of those of our industries which can engage in the manufacture of materials of war, everyone will grant. That to accomplish what needs to be done will entail sacrifice on the part of almost everyone, and longer and more arduous work for many will be acknowledged. These are self-evident truths. On them, however, is based my concern, and that of every thoughtful student of nutrition, with the existing degree of malnutrition, because controlled experimentation has taught us that willingness to sacrifice and to work, as well as the determination and courage, necessary not only in the Army but in those behind the lines, are human qualities that weaken when foods fail to provide what is needed for satisfactory nutrition.

That many American diets are deficient in quality, deficient especially in those chemical catalysts, the vitamins, which activate human energies as spark plugs activate machines, is a conclusion based on highly qualified medical advice, that of Drs. Jolliffe, McLester, Spies, Sydenstricker, Tisdall and many other physicians who because of large experience with deficiency disease possess the rather special training necessary to recognize the widespread prevalence of submarginal degrees of deficiency disease. It is based also on many recent nutritional surveys including the extensive governmental studies of consumer purchases conducted by the Bureau of Labor Statistics, the Bureau of Home Economics and the National Resources Committee.

The English, faced with a very similar problem, are taking vigorous steps to combat it. Dr. Jeoffrey Bourne has written of this in his book, "Nutrition and War." That millions of people should live on or below the borderline of minimum nutrition is a special danger in time of war. Such persons not only are unable to work effectively, they easily succumb to infectious diseases and offer a breeding ground for such pandemics as the influenza of World War I.

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The necessity for action on the nutrition front is no less pressing than that for mobilizing physical equipment, and the time element is equally important. It will take months and even years to gear up the industrial facilities for making the required tanks, planes and ships. It will require as many months or years to gear up the manpower of the nation to run the accelerated machinery. Fortunately, through the foresight of the head of the Consumer Division of the National Defense Advisory Commission, an early start was made. The leadership now is provided by Governor McNutt, Director M. L. Wilson and Surgeon General Parran. The scientific guidance is in the hands of the nutritional experts, in government and out, of the Committee on Food and Nutrition of the National Research Council. This campaign soon will be intensified. It must have the fullest possible support or the consequences may be disastrous. Without strong human defenses, military defenses fail.

The need for better nutrition not limited to this emergency

One permanent good at least seems likely to emerge from the present defense activities. The recognition which nutritional science must now receive comes none too soon. Entirely apart from the present emergency, the nutritional situation is a cause for grave concern. It presents, indeed, a public health problem of major importance. One sometimes hears men say, however, that our food habits are no worse than they were before we ever heard of vitamins; no worse, these persons say, than during the first World War, which we fought effectively.

Actually our food ways for some sixty years have been worse than at any previous time in history. They are worse today than they were in 1914, for the reason that more years have passed since certain detrimental changes were made, some sixty years ago, in the food habits of our population.

Those who have had training in biology appreciate that changes in nutritional environment are badly borne by all organisms from bacteria to mammals. A changed nutritional environment in the case of vertebrates and other higher animals means changes in the constituents of blood and lymph; in other words, changes in the "milieu interne," so called by Claud Bernard. Adjustments to changes of the milieu interne are difficult. We adjust better to external temperatures, for instance, than to equal alterations of the temperatures within the body. We can immerse our bodies in the ocean, but would perish promptly if our blood contained as much salt as ocean water.

Adjustments to changes in the blood and lymph are possible, but require generations for their accomplishment. I have no doubt that given several thousand years the human race might learn to live efficiently on a third or a fourth the amount of thiamin (vitamin B₁) which its ancestors got and came to depend on. Also, the human race might learn to do without ascorbic acid (vitamin C), as rats apparently have learned to do. But in the learning countless individuals would be sacrificed and for a long period succeeding generations would deteriorate.

A changed nutritional environment of major degree is intolerable. One of a minor degree may be appreciated with difficulty and make itself felt only from one generation to the next. This readily is shown with laboratory animals. It is more difficult to trace in the case of human beings. Although not established by sufficient proof, there is reason to believe that a relationship exists between the increasing incidences of several of the so-called degenerative diseases and the great change in our food ways, which as I said, occurred about 1880. I have in mind arteriosclerosis, diabetes, some forms of arthritis and some insanities.

You will be wondering now about this change in food ways, and for more details I must refer you to the fascinating book "The American and his Food" by Professor Robert Cummings. Of major significance was the introduction of modern methods for milling wheat and refining sugar. We did to wheat what the Chinese did to rice - milled out of it and discarded or fed to swine and cattle much of the good in it. Even worse than this we replaced about half the wheat our ancestors ate with refined sugar, than which there probably is no food less satisfactory from the standpoint of nutrition. In consequence the average American diet of today, even in families with liberal money expenditures for food contains only about a third as much thiamin as in Civil War times. And with the thiamin has gone a quota of many other nutritional substances, other vitamins and minerals. The nutritional loss from this replacement of the undermilled flour of the past with white flour and sugar has been compensated for, to a certain extent, by a greater consumption of garden vegetables and milk. Unfortunately neither garden vegetables nor milk provide thiamin so generously as does wheat. They are poorer perhaps in some of the other vitamins and minerals found in wheat. They also are more costly, at least for the city dweller, and so have gone mostly to families in upper income groups, leaving grave vitamin starvation among our poorer families.

In a nutrition laboratory at the Mayo Clinic, Dr. Williams, with Dr. Mason and other associates, has been studying volunteer subjects who are given diets made adequate in all respects except in thiamin. The scientific control is rigid. The food is analyzed for thiamin by Dr. Mason, and a double check is obtained by periodic analyses of excretions. The allowance of thiamin is regulated and changes in dosage are made without the knowledge of the subjects. In the course of such induced thiamin deficiency studies we have frequently seen cheerful, happy, vigorous, industrious young women become morose, depressed, fearful, irritable, uncooperative and slovenly in personal appearance. They lack the strength to work and any interest in working. It is equally phenomenal to see these same young women return to their normal selves when the intake of thiamin again is raised to an adequate level, but the longer the deficiency continues the more difficult it is to restore these subjects. From this, one wonders whether continued deficiency of the thiamin content of American diets may not have led to a certain degree of irremediable deterioration.

Physicians until lately have been thinking of nutrition too much in terms of frank deficiency disease. A few persons die of beriberi in

this country, but even before it was learned that nicotinic acid could be curative in pellagra, the number of deaths from pellagra recorded in any single year did not exceed a few thousand. The milder degrees of nutritional deficiency are the nub of the nutritional problem. Williams' experiments at the Mayo Clinic show that a man can subsist on as little as 0.6 mg. of thiamin a day, but that with this small intake he is only half alive. To function efficiently, to do the things that must be done now, he needs at least twice this amount, and for a safety factor at least 2 mg. How many men get 2 mg. of thiamin a day? Not more than half, probably fewer than a third, of the adult male population of the country.

Using sugar in the amounts we use it, and depending on plain white flour as we have done, thiamin, nicotinic acid and riboflavin are among the vitamins most likely to be inadequately represented in American diets. That is the reason for the recommendation of the Committee on Food and Nutrition of the National Research Council for putting these particular vitamins into enriched flour and enriched bread; that, as well as the fact that these three vitamins are involved in the oxidative changes whereby energy in the body is released from sugar. The more starch the diet contains, the greater the need for thiamin, nicotinic acid and riboflavin.

I may have emphasized disproportionately the deleterious effects of the introduction of white flour and refined sugar. Other serious faults exist in American diets. In some regions of the United States, and by some families everywhere, too little protein is obtained. In many of our poorer families lard is used instead of butter, and in their diets vitamin A is frequently wanting. In other diets, fruits are lacking and vitamin C is missed. In many diets, calcium is lacking in adequate amounts. It is difficult to get enough calcium without drinking milk, and many people don't like milk.

Planning for better nutrition

What then needs most to be done? The problem involves economics, but economics cannot be changed rapidly. Half of the people in this country have less than twenty-five cents a day to spend for food, but even if the average income of the economically lower half of the population could be doubled, an amount of malnutrition, because of bad food habits, would still remain. Food habits are correctable, but to change them requires years of patient endeavor. Education will help much. The present nutritional program contemplates extensive use of education and this must be extended as much as possible. However, the learning capacity of many people is limited. The amount of training given the average citizen cannot well extend beyond teaching him appreciation of the nutritive values of vegetables, fruits, meats and dairy products. In the country the success of education will be greater, because many of these so-called protective foods can be grown in the garden, and poultry and milk can be had economically. In the cities, unfortunately, the protective foods are beyond the means of many families or unattainable in sufficient quantities.

The education program also encounters the obstacle that most people do not care to think too much about their choice of foods. I have frequently noted that even nutritional scientists pay little heed to what they eat; indeed, I must confess to some shortcomings in this respect myself.

Professor J. C. Drummond of London University has protested against the shibboleth that nutritional security can be found in what is vaguely called a mixed diet - that in such a diet one food can be depended on to compensate for the inadequacies of another. There is no such security today for the reason that more than two-thirds of the calories of diets come in the form of sugar, plain white flour and processed fats. In such circumstances it is almost hopeless to expect the remaining third of the calories to carry all that is required of vitamins and minerals. Dr. Lydia Roberts frequently has made this comment.

Improving staple foods

What needs to be done if we are to have good diets everywhere is to make every food carry an appropriate share of some part of the responsibility for an adequate daily supply of all the nutritive essentials. Could that be done people would find themselves always surrounded by protective foods and in such favorable surroundings a mixed diet would provide security.

Alternatives to such a procedure can be thought of. We could try, for instance, to provide everyone with vitamins in capsules or tablets, or as has been suggested, with a supplementary food composed of wheat germ, dried yeast and other vitamin concentrates. The objection to these alternatives is psychologic. Most people don't like taking medicine and won't take capsules or tablets, at any rate not for long. The vitamin capsule, even if it could be compounded to provide all that was needed - which is a doubtful possibility - would be neglected. The supplementary food would encounter consumer resistance. People are as choosy with their breakfast cereals as with their brands of cigarettes, and to concoct a supplementary food to suit the taste of everybody presents a practical impossibility. Vitamin capsules and supplementary highly fortified foods have a place of importance in restricted fields, but much more likely to succeed in any nationwide attack on malnutrition is a program based on assuring the nutritive quality of all foods, with special attention to the inexpensive staples.

There are two ways to accomplish improvement of staple foods. People perhaps in time can be persuaded to eat only natural foods, unprocessed food. The idea dates from Sylvester Graham. However, the virtues of natural foods have been extolled for a hundred years since Graham's time and the results are disappointing. Much good has come from nutritional education, but far from enough to solve the national need for better food.

Legislative prohibition of processed foods also probably would fail. Such a procedure is not the democratic way, and the net result

would be a return of the bootlegger. Also the vested interests aroused would be gargantuan, and in practice any such procedure would create enormous difficulties of transportation and distribution. The costs of food would rise. The natural foods are perishable and perforce expensive.

Fortunately another way exists, one that will not conflict with popular tastes or seriously disturb investments of industry in plants and equipment, a way by which the advantages of food processing may be retained and disadvantages corrected. The food processor until recently has devoted his attention to securing a product pleasing to eye and taste. He has not been concerned with nutritive values. He knew little or nothing about such values, but he now is ready to learn and is prepared to act.

Enriching flour and bread

A start already has been made with flour and bread. Plain white flours and plain white breads are being enriched with thiamin, nicotinic acid, riboflavin and iron, according to the recommendations of the Committee on Food and Nutrition of the National Research Council. As the other factors of the vitamin B complex become available inexpensively, they too may be included in the specifications for these products, and as methods of milling develop which permit retaining the vitamins and minerals in white or creamy flours, their use will provide not only thiamin, nicotinic acid, riboflavin and iron, but the other nutritive constituents found in wheat. The reason for the emphasis on content of thiamin, nicotinic acid and riboflavin is the knowledge we now possess that these three vitamins are specifically concerned in the oxidative reactions in the body by means of which we liberate the energy in the sugar that comes from starchy foods like flour.

The reason for the emphasis on having a white or at most a creamy colored flour is that most persons don't like brown bread and those who eat brown bread do not, as a rule, use whole wheat flour in their cakes and pastries or in their gravies and sauces. To get the vitamins needed for the effective utilization of the starch of flour, not only flour used in bread but flour used for all purposes should contain them.

Furthermore, the brown bread that most brown bread eaters buy is made of part white flour and is only partly graham. The brown bread eaters recall the cold bath takers. The benefits they get impresses me as being mostly a feeling of righteousness. Also, as physicians we know from much clinical experience that bran flakes are not well tolerated by many persons. Brown and gray breads won't do for such persons. They are disliked by others and for these reasons the dark loaf cannot be expected to compete successfully with the white, where both brown and white loaves are available.

What little opposition thus far has come to the recommended program for enriching flour and bread is mostly from those who hold as a matter of principle that "the good is really the enemy of the best."

Most of us believe it is "better of make this compromise than to let the people suffer from vitamin starvation, perhaps for years."*

Edible fats should be improved

Edible fats must soon receive attention. Just as products of wheat supplied mankind for untold generations with the water soluble vitamins of the B complex, so butter, cream and organ meats like liver and bone marrow provided him with much of what he needed of the fat soluble vitamins, especially vitamin A and vitamin D. Less recently, than in the case of wheat, a change took place in this arrangement. Milk production became an industry and cows fed on winter fodder yield milk with butter fat less rich in vitamins. Also in place of butter, margarine was developed. At first it was made of fats of animal origin, later to a large extent from vegetable oils. In neither of these products does the content of vitamin A approach that of butter. Vitamin A can be synthesized in the human organism, as in the cow's, from carotene, and plenty of greens in the diet in most cases will provide what carotene is needed. Greens, however, are expensive for city dwellers, and infants and very young children cannot well take greens or do not do so. The story of how Danish children lost their eyes during the last war because the Danes, tempted by high prices, sold their butter to the Germans has been frequently recounted. Since then fortification of margarine with vitamins A and D has been made compulsory in Denmark by legislation.

Last year in the United States not more than 100 million of the 400 million pounds of margarine was fortified, and by regulation no margarine containing any animal fat could be thus improved. That regulation now, by an order of the chief of the Bureau of Animal Industry, has been suspended. It seems to me probable that we shall go further than this. We certainly must recommend that butter and margarine which contains an approved amount of vitamin A and vitamin D be preferred to other butter or margarine, but also because many persons use lard as a substitute for butter I would like to see all lard with a fixed added content of these vitamins. The expense would be insignificant. The benefit among the poor would be enormous. The prevalence of night blindness in England is said to be revealed by an increasing number of "blackout" accidents and deaths.

The milk problem

Improving staple foods need not, and indeed should not, be limited to additions of vitamin concentrates or synthetics. The distribution of milk as this now is practiced is wasteful. Much of the production is never brought to the market, and many who need milk most cannot afford to get it. Remove the fat from a quart of whole milk costing the consumer ten cents or more, sell it as butter or cream to those who can afford to buy butter and cream, and in the skim milk solids that remain you have another product which being more or less imperishable could be

*The quotation is from the answer by Bruce Bliven to a letter in The Countryman, England (New Republic, March 24, 1941, p. 407).

distributed for a cent or two, a tenth the cost of fluid milk. Of all the valuable nutritives contained in milk, by far the greater number remain in the skim milk solids. In this sense skim milk solids represent the best part of milk. They are a good food source of calcium, and more diets probably are deficient in calcium than in any other food essential. Also in milk and remaining in the skim milk solids are all of the water soluble vitamins and the most perfect proteins known, casein and lactalbumin.

But how can universal use of skim milk solids be obtained? This problem now is receiving attention in the nutritional program. At present much skim milk is wasted or used uneconomically in feed for swine and poultry. A solution I have to propose would provide an answer not only to this problem, but to another, that of sugar.

The sugar problem

The daily consumption of sugar in the United States, most of it refined sugar, averages per capita approximately $5\frac{1}{2}$ ounces. The addition to the diet of this material, representing more than 600 calories, or a fourth of all the calories of the diet, and carrying no vitamins and no minerals, is a major nutritional error. Nutritionists agree that of all foods sugar unquestionably is the worst. Yet the public demands sugar because of its sweetness. Also the public wants its sugar white. To believe otherwise involves wishful thinking and is unrealistic. Brown sugar cannot compete in the national market with white sugar, nor can sorghum or molasses. Some samples of molasses are rich in vitamins, others are not, and much brown sugar and molasses contains material that is undesirable.

Our country literally is a land flowing with milk and honey, but the milk, as I have said, is largely unconsumed and the honey is in the form of refined sugar. Why not ask the sugar to carry the milk, and thereby provide sugar with the vitamins necessary to make its energy effective? Were each average daily per capita portion of sugar ($5\frac{1}{2}$ ounces) to be combined with only a little more than an ounce of skim milk solids, we should improve the American diet to the extent of including in it the equivalent of a pint of skim milk. For most cooking purposes the presence of 22 percent of skim milk solids in sugar would be advantageous rather than otherwise. I can foresee, however, objections from soda pop fanciers and those who like their liquors clear. The answer for them might be to use whey solids. Whey will go into a fairly clear solution. Whey represents the milk less casein. The lactalbumin, which contains all the biologically necessary amino-acids, remains, as does most of the content of water soluble minerals and vitamins. Whey is produced in enormous quantities as a by-product in the manufacture of cheese, and although some of it finds a market in poultry feed, it mostly today is not used for any purpose.

How about ascorbic acid (vitamin C)?

Were all flour to be "enriched" as now is recommended, were all edible fats to be fortified with vitamins A and D to reasonable limits,

and if little more than an ounce of the solids of milk or whey could be incorporated in everybody's diet, thiamin, riboflavin, nicotinic acid, iron, calcium, vitamin A, vitamin D and at least a minimal quota of all the biologically necessary amino-acids would be automatically provided.* Remaining for attention is ascorbic acid, the antiscorvy vitamin, vitamin C. If we can also arrange for its supply we shall have corrected, in all probability, the dietary deficiencies which mainly confront us. There may be other factors to think about later, but proof of their significance in human nutrition, or for their absence from even poor American diets, is not in the evidence today. In any case, as soon as the millers have learned how to mill a white flour which retains all the nutrients of wheat grain, we shall have no need to worry about other factors. They will be found in such flour.

Vitamin C, ascorbic acid, however, remains a problem. It is an old problem. Scurvy is said to have dogged the Crusaders. It is thought to have contributed more than anything else to the failure of the Vikings to colonize America. Directly, or indirectly, by predisposing to infections, scurvy has caused more loss of life in past wars than all the engines of war combined. It is said to have hastened the tragedy of the siege of Kut, to have weakened the British at Gallipoli in 1918, and to have contributed importantly to the collapse of Germany. Forewarned by this experience the Germans are said to have built up a huge reserve of synthetic ascorbic acid for this war.

Ascorbic acid is sensitive to oxidation. It cannot be heated without great loss and for this reason is little suited for fortification of any staple food. However, we have in our country vast supplies of citrus fruits and an abundance of tomatoes, all very acceptable to consumers. The problem is one of distribution. Subsidy may be necessary. Economies probably could be effected by suitable processing of the juices. Also potatoes are a fair source of this important substance and potatoes are abundant and inexpensive.

The science of nutrition an instrument of social policy

A program such as that proposed would create the nutritional environment desired, in which to go wrong in nutrition would be difficult. The inexpensive staple foods which everybody eats would provide at least a minimal requirement of all the vitamins, minerals and amino-acids, and the balance then would easily be secured from whatever other foods were chosen to complete the diet.

The program, instead of provoking the opposition of the industries affected, should win their wholehearted cooperation, as it has in the case of the millers and bakers. Food habits - so difficult to change - should interfere scarcely at all. We still would have white flour, white

*More iodine is needed in goiter regions, the states bordering on the Great Lakes and some mountain states. An adequate supply can be obtained by using iodized salt (one part sodium or potassium iodide to 5000 parts salt). Use of such salt has long been recommended by the Council on Foods and Nutrition of the American Medical Association.

bread, white sugar, margarine, and lard, but these would be good flour, good bread, good sugar and good fat. Malnutrition in such circumstances should vanish as a public problem, and with it undoubtedly would go much other disease.

The day has come when the science of nutrition must be recognized as an instrument of social policy. To put existing knowledge of nutrition to work is a duty now; and with willingness on the part of government to cooperate with science and industry, enlightened procedure by industry, and vigorous leadership by those who have influence on public opinion, this will be done.

